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To Christopher Lichens/R9/USEPA/US@EPA, <tperina@ch2m.com>, <lparnass@dtsc.ca.gov>, <mgrigori@ch2m.com>
cc "Ed Modiano" <edm@demaximis.com>, "Eisenbeis, John" <EisenbeisJJ@cdm.com>
bcc
Subject Draft Updated FS text

History: This message has been replied to.

Chris, et al. - in advance of our call at 10:00 this morning, attached is a draft of new FS language, designed to address all of the issues that we discussed yesterday. You'll note that we taken your text, as e-mailed yesterday morning and as redlined by us, and inserted it into this new Section 6.2.

Please note that our OPOG client has not reviewed this text, but we thought it might be helpful for today's discussion.

Look forward to talking with you.

Dave


Section_6_2.doc

6.2 Estimating Cleanup Times

There is often significant innate uncertainty in estimating subsurface remediation times due to uncertainties associated with the precise distribution of contaminants and the rates that the contaminants will respond to the applied treatments. However, for the purpose of evaluating remedial alternatives, it is necessary to make these estimates. This subsection describes the approach that has been taken to estimate remediation times for Alternatives 2, 3 and 4.

For the SVE components of all three alternatives, it has been assumed that the system would be operated until asymptotic total VOC removal rates have been achieved. In achieving these removal rates, operation of the SVE system would reduce the potential for vapor migration beyond capped areas in all three alternatives. Rebound testing would then be performed to document the extent of VOC concentration rebound that occurs after the system has been shut down for an extended period of time. If rebound testing results indicate no significant VOC mass would be removed by continued SVE operation, then the system will be turned off, subject to periodic monitoring of vapor concentrations.

The SVE systems would reduce contaminant concentrations in soil to below the industrial site-specific PRGs and would further target achieving residential site-specific PRGs. For the purpose of this FS, it has been assumed for Alternatives 2 and 3 that SVE would operate for 5 years and that rebound testing would occur for 6 months thereafter.

To estimate the remediation time for Alternative 4, we have relied on the experience of Thermal Remediation Services (a major thermal remediation vendor). It is assumed that thermal-enhanced SVE would reach asymptotic conditions and soil concentrations below the site-specific PRGs in one year. An additional 6 months are assumed to verify remediation via rebound testing for a total remediation time of 1.5 years.

Lastly, it has been assumed that the soil VOC concentrations following SVE operations for all three alternatives would meet the third RAO and be protective of groundwater quality. This is based not only on the known ability of SVE to reduce soil VOC concentrations to low levels, but also because all three alternatives include capping of unpaved areas within the PCE site-specific PRG for PCE (Figure 7-2). The capping component would significantly reduce the amount of water that infiltrates through the vadose zone to the underlying groundwater, further adding to the protection of groundwater.

SVE System Optimization

The SVE pilot test results from the site indicate that a significant ROI can be achieved in the vadose zone and that a high flow rate per well can be achieved. In addition, the vacuum readings that were collected during pilot testing indicate that a relatively uniform vacuum field was established in the soils around each well tested. These findings together suggest that SVE will be able to meet RAOs and achieve the cleanup goals for the site.

As performance monitoring data are collected they would be evaluated with regard to the likelihood of achieving the site cleanup goals in a timely manner. If the data indicate that there are one of more areas that have relatively high VOC concentrations, and/or that there are significant "dead zones" (volumes of soil where little soil vapor is flowing), then optimization measures would be implemented. These would include:

- altering the applied vacuum levels to appropriate SVE wells with the objective of modifying the soil vapor flow patterns to eliminate dead zones
- capping some passive injection wells to modify the vapor flow patterns and eliminate dead zones
- adding new SVE wells at locations where significant dead zones exist

These optimization methods are commonly used for SVE systems and are usually highly effective in addressing problem areas of the vadose zone. If this is not the case, then system enhancements would be evaluated for implementation.

System Enhancements

There are several methods that can be used to enhance the performance of SVE if it appears the cleanup goals may not be achieved in a timely manner. These include: hot air injection and other thermal techniques, pneumatic and hydraulic fracturing, and DPE.

As a contingency, cost estimates for two of the more likely enhancements (hot air injection and DPE) have been prepared and included in the cost spreadsheets in Appendix B.

SVE would be operated until asymptotic total VOC removal rates have been achieved at each extraction well. Periodic rebound testing would be performed to document increases in the VOC concentrations that occur after the system has been shut down for an extended period of time. The first rebound test would likely be performed when the total system mass removal rate becomes nearly steady (asymptotic).

If after system optimization the post-rebound VOC concentrations remain above the site-specific PRGs for soil gas, as defined in Table D-3.1 in the HHRA, then enhancements to the SVE system, potentially including hot air injection, and/or DPE would be implemented . The enhancements would be implemented for the entire system or at a targeted area, but at a minimum at the wells that triggered the enhancement installation.

If VOC concentrations remain above the site-specific PRGs after initial enhancement is implemented, and data demonstrate that significant vapors are derived from volatilization from groundwater, then additional enhancements, potentially including DPE would be implemented.

If post-rebound VOC concentrations at a given well are below site-specific PRGs, then SVE from that well would be terminated and the well would be turned to a passive injection well (as appropriate) subject to capping and monitoring of vapor concentrations for VOCs during future rebound tests.

Changes in the system operation, such as the termination of SVE from a given well, timing and duration of rebound tests, turning of wells into passive injection wells, changes of flow rates and applied vacuum from design levels, and installation of SVE enhancements would be subject to EPA review and approval.